Remarks

In this paper, no claims have been amended, added or cancelled. Claims 1, 2, 4-15, and 23 are pending and are presented for examination.

Claims 1, 2, 4-12, and 15 stand rejected under 35 USC § 103(a) as being unpatentable over Gehlsen et al. (US 6,103,152) in view of Parsons et al. (US 5,851,663).

Gehlsen discloses an article that includes a polymer foam that may include one or more separate adhesive compositions bonded to the foam, e.g., in the form of a layer (col. 2, lines 61-62). However, Gehlsen does not teach or suggest the inclusion of fire retardant compositions in the foam layer in combination with an adhesive layer formulated without fire retardant. While Gehlsen mentions the general possibility of including a fire retardant in the disclosed foams (see col. 8, lines 44-55), Gehlsen does not suggest the specific inclusion of antimony-free fire retardant in the foam layer in combination with an adhesive layer formulated without fire retardant. Additionally, Gehlsen provides no motivation to those skilled in the art to add specific fire retardants such as antimony-free fire retardants to a foam article while formulating a skin adhesive without fire retardant for use in combination with the fire retardant foams.

Unlike the articles described by either Gehlsen or Parsons, the present invention provides, in part, an expanded polymer foam material comprising antimony-free fire retardant with a plurality of expanded polymeric microspheres, the foam material having an outer surface comprising a first major surface and a second major surface; and an adhesive layer formulated without fire retardant and disposed on at least a portion of one of the first or second major surfaces. The microspheres included in the articles of the invention comprise a polymer shell and a core material in the form of a gas, liquid, or combination thereof. When heated during the foaming process, the polymer shell softens and expands due to the expansion of the core material. Typical core materials are any of several combustible gases (e.g., propane, butane, pentane, isobutane, neopentane, or similar material and combinations thereof) (see application, page 9, lines 11-15). In contrast to the articles described by Gehlsen, the present invention surprisingly provides

fire retardant foam articles containing expanded (and combustible) polymeric microspheres. It was unexpected that an article comprising a foam containing such combustible and flammable core materials could be made to be fire retardant, especially in view of the amount of microspheres present in the foams, i.e., 0.1 parts by weight to about 20 parts by weight based on 100 parts by weight of polymer (see claim 1). Skin adhesives, like those used in the present invention, include combustible ingredients. In the absence of fire retardant in the adhesive formulation, skin adhesives are generally present in combustible amounts. Therefore, it is more surprising is that foam articles according to the invention are fire retardant even though they include expanded (and combustible) microspheres with a skin adhesive layer on the foam that is formulated without a fire retardant.

The fire retardant nature of the articles of the invention allow them to be used in certain applications that are generally unavailable to the articles of Gehlsen. Such applications include electric or electronic applications where the foam articles may be exposed to electrical current, to short circuits, and/or to heat generated from the use of the associated electronic component or electrical device. Industry standards impose conditions on the use of tape articles like the foams of the present invention. For electrical and electronics applications, the industry standard flammability test is Underwriters Laboratories (UL 94 "Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances"). For rail transit and transportation applications, the industry standard is American Society for Testing and Materials ASTM E662 ("Test Method for Specific Optical Density of Smoke Generated by Solid Materials") and ASTM E162 ("Test for Surface Flammability of Materials Using a Radiant Energy Source"). For aerospace applications, the testing criteria for the Federal Aviation Administration F.A.R. § 25.853 (July 1990) vertical burn test, subparagraph (a)(1)(i), relates to interior compartments occupied by crews or passengers, including interior ceiling panels, interior wall panels, partitions, galley structures, large cabinet walls, structural flooring, and materials used in the construction of stowage compartments. F.A.R. § 25.853 (July 1990) subparagraph (a)(1)(ii) relates to seat cushions, padding, decorative and nondecorative coated fabrics, leather, trays and galley furnishings, electrical conduit, thermal and acoustical insulation and insulation covering air ducting, joint and edge covering and the like. Materials used for these applications must be self-extinguishing when tested vertically in accordance with the procedures of F.A.R. § 25.853 (July

1990) (a)(1)(i) and (a)(1)(ii). In addition for both rail transit and aerospace applications, another industry standard is Boeing Specification Support Standard, BSS 7239 ("Test Method for Toxic Gas Generation by Materials of Combustion") which requires analysis of combustion gases and has specified concentration limits on toxic gases which currently include HCN, NO_X, CO, HCl, HF, and SO_2. It was surprising and unexpected that an article according to the invention comprising a foam containing flammable core materials with an antimony-free fire retardant with a skin adhesive free of fire retardant could pass one or more flammability test such as the foregoing UL 94, F.A.R. § 25.853, ASTM E162, ASTM E662, and BSS 7239 (see Applicant's specification page 20, lines 9-10 and claim 15).

Parsons does not make up for the deficiencies of Gehlsen. Parsons discloses pressure-sensitive adhesive compositions comprising an adhesive selected from the group consisting of rubber resin adhesives and acrylic adhesives containing from about 10 to about 60 % by weight of adhesive of a non-halogen intumescent flame retardant (see, e.g., Abstract). For certain applications, where a thick adhesive is necessary, a "foam" pressure sensitive adhesive in the form of the foam having cells throughout the adhesive can be generated by frothing (as disclosed, for example, in U.S. Pat. No. 4,415,615) or by incorporating glass hollow microspheres (as disclosed, for example, in U. S. Pat. No.4,233,067) or polymeric hollow microspheres (as disclosed, for example, in EP 257984 wherein the cells occupy 20-65% of the volume of the adhesive). However, Parsons does not teach or suggest a flame retardant article, comprising an expanded polymeric foam material with expanded polymeric microspheres and antimony-free fire retardant in combination with an adhesive layer formulated without fire retardant.

For at least the foregoing reasons, the pending claims are allowable over the foregoing art, and the reconsideration and withdrawal of the rejection of Applicant's claims is now requested.

The Office Action also includes additional rejections of (i) dependent claims 13 and 14; and (ii) dependent claim 23. It is believed that independent claim 1 is allowable over the cited art

for at least the reasons set forth in this paper. With the allowance of claim 1, claims 13, 14 and 23 are also allowable over the cited art.

Applicant has endeavored to address each of the issues raised in the Office Action. It is believed that the pending claims are allowable over the cited art and the allowance of the application is now solicited.

Respectfully submitted,

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